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Ontario Tree Improvement and Forest Biomass Institute Publications 1980-1985

(An Annotated Bibliography)

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INTRODUCTION

This annotated bibliography covers research reports, papers and journal articles written by staff of the Ontario Tree Improvement and Forest Biomass Institute between 1980 and 1985. Book reviews are not included.

Publications are listed alphabetically by first author, under the year of publication. (Proceedings of conferences, workshops and symposia are frequently published one or more years after they are held.)

Authors' names shown in brackets indicate associates who are not from OTIFBI.

Unless otherwise stated, reprints or photocopies of individual articles and reports can be obtained free from OTIFBI. Some complete proceedings of conferences, workshops and symposia are also available.

1980

1. ANDERSON, H.W. 1980. Intensive management of hybrid Populus. For. Chron. 56(4): 171-173.
(Observations on the Ontario experience with the short rotation concept of hybrid Populus management, with special reference to aspen, are presented and discussed.)

2. ANDERSON, H.W. and L. ZSUFFA. 1980. Hybrid poplar plantation biomass--a potential source of energy in Ontario, Canada. 16th Session, International Poplar Commission, Izmir, Turkey, 4-8 November, 1980. 5 p.
(Results of hybrid poplar research and management in Ontario are used to discuss the potential of hybrid poplar as a source of energy.)

3. (BLUM, B.M., R.M. FRANK) and A.G. GORDON. 1980. Red spruce--yellow birch. Type 30. In Forest cover types of the United States and Canada. Society of American Foresters, 5400 Grosvenor Lane, Washington, D.C. pp. 21-22.
(Describes and discusses red spruce--yellow birch cover type in northeastern North America.)

4. (BUBENIK, A.B.), F.L. RAYMOND and (P. MEILE). 1980. Alpine Umweltsprobleme, Ergebnisse des Forschungsprojects Achenkirch. Teil VIII; Form und Grosse der Gamskrucke--Eine vorlaufige Untersuchung. Beitr. z. Umweltsgestaltung. Band A 67: 99-175. (Also appeared as: Morphometry of the horns of chamois (Rupicapra rupicapra): A preliminary study, Proc. XIIIth Congress of Game Biologists, 1977, pp. 351-354.)
(The curvature of horns and the divergence of horn tips were compared in male and female chamois of various ages killed between 1843 and 1973 in the Alps. The results may explain why adult male chamois often experience difficulty in distinguishing fertile females from young males.)

5. BURGER, D. 1980. Site selection for black walnut. Your Forests 13(3): 11-13.
(A discussion of the effects of soil texture, structure, nutrients and drainage, local climate and rooting depth on quality growth.)

6. BURGER, D. Forest site classification and evaluation. Suggestions for curriculum and research. Forestry Faculty, Agric. Univ. Malaysia. Mimeo 38 p.
(New outlines and amendments for 14 undergraduate courses (four years) and brief descriptions of 23 problem areas for interdisciplinary research. Suggestions are made for research administration.)

7. FAYLE, D.C.F. 1980. Secondary thickening in tree roots and environmental influences. In Environment and Root Behaviour. D.N. Sen (Ed.). Geobios International, Jodhpur, India. pp. 94-118.
(The effects of the soil environment on the distribution, anatomy and timing of wood formation in root systems are discussed.)

8. FAYLE, D.C.F. 1980. Cine-analysis of an 18-m tall poplar stem. Abstract in Control of Shoot Growth in Trees. C.H.A. Little (Ed.). Proc. of the Joint Workshop of IUFRO Working Parties on Xylem and Shoot Growth Physiology, Fredericton, N.B. p. 346.
(2-cm thick discs were photographed sequentially with a 16-mm movie camera to examine changes in the annual ring and stain boundaries as one travels 'through' the stem.)

9. GLERUM, C. 1980. Food sinks and food reserves of trees in temperate climates. New Zealand J. For. Sci. 10(1): 176-185.
(Carbohydrates are the most abundant type of food reserve, but lipids are also important. All tissues are important for food reserve storage, although not of equal importance, depending on the tissue's relative volume and physiological state.)

10. GLERUM, C. 1980. Electrical impedance techniques in physiological studies. New Zealand J. For. Sci. 19(1): 196-207.
(Electrical impedance trends in the spruces are always more distinct than those in the pines. It is inferred that these trends reflect the stage of dormancy and frost hardiness to some degree; but further refinement of the impedance technique is needed.)

11. GLERUM, C. and (J.J. BALATINECZ). 1980. Formation and distribution of food reserves during autumn and their subsequent utilization in jack pine. Can. J. Bot. 58(1): 50-54.
(In conifers, all tissue components of the tree such as roots and needles store food reserves during fall and winter. Starch and sugars are not the only types of carbohydrate reserves; some hemicelluloses should also be included.)

12. GORDON, A.G. 1980. Red spruce--sugar maple--beech. Type 31. In Forest cover types of the United States and Canada. Soc. of American Foresters, 5400 Grosvenor Lane, Washington, D.C. p. 22.
(Describes and discusses red spruce--sugar maple--beech cover type in northeastern North America.)

13. GORDON, A.G. 1980. Paper birch--red spruce--balsam fir. Type 35. In Forest cover types of the United States and Canada. Soc. of American Foresters, 5400 Grosvenor Lane, Washington, D.C. p. 23.
(Describes and discusses paper birch--red spruce--balsam fir cover type in northeastern North America.)

14. GORDON, A.G. 1980. Spruce genetics, Sault Ste. Marie in 1977 and 1978. In Proc. 17th Meeting Can. Tree Improvement Assoc., Part 1. Gander, Nfld., 27-30 Aug. 1979. pp. 117-121.
(Discusses the forest genetics and tree improvement program in spruce involving inter- and intraspecific hybridization.)

15. HO, R.H. 1980. Pollination mechanism and seed production potential in Douglas-fir. For. Sci. 26(4): 522-528.
(Based on seed cone development and seed potential analysis, the most favourable period for controlled pollination appeared to be when a seed cone is three-quarters emerged from the bud scales.)

16. JACIW, P. and H.C. LARSSON. 1980. Vegetative propagation of black walnut. In 71st Annual Report, Northern Nut Growers Assoc. pp. 70-74.
(Layering sectioned subterranean parts of black walnut resulted variously in callus formation, root regeneration and suckering. A zone of relatively high regeneration potential exists on the tree axis below the soil surface adjacent to the upper lateral root system.)

17. LARSSON, H.C. 1980. Asian nut pine nursery problems. In 71st Annual Report, Northern Nut Growers Assoc. pp. 77-80.
(Frost heaving, destruction by rodents and nutritional problems are the three major problems affecting the survival of Korean and Siberian nut pines in the nursery.)

18. McCLAIN, K.M. 1980. Nursery cultural practices affect post-planting performance of white and black spruce. Agronomy Abstracts 1980. p. 203.
(Describes effects of nitrogen levels and seedbed density on subsequent growth of white and black spruce.)

19. MULLIN, R.E. 1980. Is moss necessary in all nursery stock packaging? For. Chron. 56(3): 109-111.
(Overwinter storage tests of white spruce, white pine and red pine, and spring storage procedures with two containers (Kraft-polyethylene bag and polybin) showed from the field planting that moss was of no benefit in the packaging.)

20. MULLIN, R.E. 1980. Comparison of seedling and transplant performance following 15 years' growth. For. Chron. 56(5): 231-232.
(The fifteenth year remeasurements of a large series of experiments showed that transplants produced 26-56% more growth (aggregate height) at a cost saving of 11-23%.)

21. MULLIN, R.E. 1980. Water dipping and frozen overwinter storage of red and white pine. U.S. For. Serv. Tree Planters' Notes 31(3): 25-28.
(The practice of water dipping of the roots of red and white pine in the fall, before overwinter frozen storage, was found to be damaging.)

22. MULLIN, R.E. 1980. Recent tests of seedlings versus transplants. OMNR Forest Res. Note No. 26. 4 p.
(Tests starting in 1977 of current different age-classes of seedlings and transplants of white spruce and red pine indicate that the field performance of transplants is considerably better than that of seedlings, and of the same magnitude or greater than in earlier tests.)

23. MULLIN, R.E. and (J.D. PARKER). 1980. Nursery use of beach detritus. OMNR Nursery Note No. 69. 4 p.
(A potting test of the material obtained from beach cleaning at Wasaga Provincial Park showed that this material could probably be used with some benefit as a nursery soil amendment.)

24. RAYMOND, P.L. 1980. INREG--An interactive computer program for multiple linear regression by least squares. OMNR Forest Res. Rep. No. 106. 21 p.
(Grosenbaugh's REX approach to regression appears vastly superior to the stepwise approach for most research and modeling applications but results are voluminous with large numbers of variables. INREG provides many of the REX features for interactive usage via a computer terminal and allows the user to arrive very quickly at a "best" equation as defined by Grosenbaugh.)

25. (SASTRY, C.B.R.) and H.W. ANDERSON. 1980. Clonal variation in gross heat of combustion of juvenile Populus hybrids. Can. J. of Forest Res. 10(3): 245-249.
(Energy values were analyzed for 2-year-old sprouts of 10 hybrid Populus clones of diverse genetic background. Values showed a clonal range of 14%.)

26. SKEATES, D.A. 1980. Forest tree seed research in Ontario. In Proc. 17th Meeting Can. Tree Improvement Assoc., Part 1. Gander, Nfld., 27-30 Aug. 1979. pp. 129-132.
(A summary of projects within three research programs--variability due to physical seed characteristics, variability due to seed source, and modified stock production systems--conducted since 1968.)

27. STROEMPL, G. 1980. Plastic netting to protect trees from animal damage. OMNR Forest Res. Note No. 27. 4 p.
(Perforated polypropylene netting placed over red oak transplants established in 1978-79-80 were successful against deer, mice and rabbit damage.)

28. WEINGARTNER, D.H. 1980. The effects of scarification on trembling aspen in northern Ontario. For Chron. 56(4): 173-175.
(Preliminary assessments of four study areas in northern Ontario indicate that scarification increases sucker density and stocking, if applied before suckering commences, and all scarification results in a reduction in dominant sucker height.)

29. ZSUFFA, L. 1980. Poplar, white pine, and ornamental tree breeding in Ontario Forest Research Centre, Maple, Ontario, in 1977 and 1978. In Proc. 17th Meeting Can. Tree Improvement Assoc., Part 1. Gander, Nfld., 27-30 Aug. 1979. pp. 133-138.
(An outline of activities and results.)

30. ZSUFFA, L. 1980. The role of exotic and hybrid poplars in the poplar improvement program of Canada. In Proc. 17th Meeting Can. Tree Improvement Assoc., Part 2. Gander, Nfld., 27-30 Aug. 1979. pp. 43-50.
(A review and discussion including an outline of exotic and hybrid poplars in Canada and the role of interspecific poplar hybrids.)

31. ZSUFFA, L. 1980. The program and the activities of Planning Group 'B'--Growth and Production of the Biomass, Forestry Energy, International Energy Agency. 16th Session, International

Poplar Commission, Izmir, Turkey, 4-8 Nov. 1980. 4 p.
(Describes the organization and summarizes the activities and results.)

32. ZSUFFA, L. and H.W. ANDERSON. 1980. A summary of poplar research and development work in Ontario, Canada. 16th Session, International Poplar Commission, Izmir, Turkey, 4-8 Nov. 1980. 10 p.
(A concise summary of the history and work of the present programs.)

33. ZSUFFA, L., D. BOUFFORD and M. LEGGAT. 1980. Update of Canadian activities in poplar biomass production and utilization. ENFOR project P-139. Can. Forestry Service. 62 p.
(An historical review and a summary of present research and management programs, with a bibliography of Populus in Canada.)

1981

1. BURGER, D. 1981. Summary and recommendations. In Proc. Boreal Mixedwood Symposium. R.D. Whitney and K.M. McClain (Eds.) Canadian Forestry Service/OMNR. COJFRC Symp. Proc. O-P-9. pp. 273-278.
(Summarizes 24 papers presented at the symposium and refers to a 1979 COJFRC report for 17 recommendations.)

2. FAYLE, D.C.F. 1981. Internodal changes in ring width along a red pine stem. Mitteilungen der forstlichen Bundesversuchsanstalt Wien 142 (1): 57.66.
(Overall longitudinal changes in the width of the growth layer are a combination of changes within the internodes and at the nodes (branch whorls).)

3. FAYLE, D.C.F. 1981. What soil grade changes do to tree roots. Buckeye Arborist, May/June: 4-6.
(Factors that affect root growth, and the interrelations between the root and shoot systems are discussed to provide an understanding of potential effects of changes in soil grade.)

4. FAYLE, D.C.F. 1981. Frost rings formed in 14-m tall red pine. For. Chron. 57: 123.
(Frost rings had formed at the start of most annual rings in the two internodes below the current leader until the trees were nearly 14-m tall.)

5. FAYLE, D.C.F. 1981. Groove formation in the stem of red pine associated with branches. Can. J. For. Res. 11: 643-650.
(The occurrence of grooves both above and below the base of branches indicates effects via both xylem- and phloem-transported substances, with the former having a greater effect.)

6. GORDON, A.G. 1981. Impacts of harvesting on nutrient cycling in the boreal mixedwood forest. In Proc. Boreal Mixedwood Symposium. R.D. Whitney and K.M. McClain (Eds.) Canadian Forestry Service/OMNR. COJFRC Symp. Proc. O-P-9. pp. 121-140.
(Provides a biomass, productivity and nutrient cycling model for typical boreal mixedwoods and information on the impact and resilience of this forest ecosystem when subjected to full-tree harvesting.)

7. GORDON, A.G. 1981. Woodlands data set. In Dynamic Properties of Forest Ecosystems. D.E. Reichle (Ed.) International Biological Programme 23, Cambridge Univ. Press. pp. 576-579.
(Contributes a biomass, productivity and nutrient budget for use in synthesis calculations of forest ecosystem models of the world.)

8. LEECH, R.H. and Y.T. KIM. 1981. Foliar Analysis and DRIS as a guide to fertilizer amendments in poplar plantations. For. Chron. 57: 17-21.
(The use of foliar analysis in conjunction with the Diagnostic and Recommendation Integrated System (DRIS) of Beaufils

is demonstrated in poplar clone D38 to guide fertilizer amendments and monitor subsequent tree growth by use of greenhouse and field standards.)

9. LOZANO, F.C. and (I.K. MORRISON). 1981. Disruption of hardwood nutrition by sulphur dioxide, nickel and copper air pollution near Sudbury, Canada. J. of Environmental Quality 10: 198-204.

10. McCLAIN, K.M. 1981. Definition and distribution of the Boreal Mixedwood Forest in Ontario. In Proc. Boreal Mixedwood Symposium. R.D. Whitney and K.M. McClain (Eds.) Canadian Forestry Service/OMNR. COJFRC Symp. Proc. 0-P-9. pp. 5-9.
(A definition of the Boreal Mixedwood Forest is presented in terms of species composition and site. Over 50% of Ontario's productive forest land lies within the boreal mixedwood forest, denoting its significance to the forest economy of the province.)

11. MULLIN, R.E. 1981. Water dipping and moss packaging for frozen overwinter storage of jack pine. US Forest Service, Tree Planters' Notes 32(1): 3-5.
(Water dipping and/or use of sphagnum moss was found unnecessary for frozen overwinter storage of jack pine in Kraft-polyethylene bags.)

12. MULLIN, R.E. 1981. Response of a white spruce and white pine planting to sulphur and fertilizer tablets. US Forest Service, Tree Planters' Notes 32(1): 14-15.
(Ten years after planting, white spruce and white pine showed little or no benefit from acidification with sulphur or from planting 'pills'.)

13. MULLIN, R.E. 1981. Effects of size of frozen stored 3+0 pine on field performance. OMNR Nursery Note No. 71. 6 p.
(A test of three sizes of 3+0 red pine in overwinter storage showed no difference in storage capability.)

14. MULLIN, R.E. 1981. Seedbed density effects on red pine in the nursery and after outplanting. OMNR Nursery Note No. 72. 5 p.
(Growth responses in the nursery and after outplanting indicate a direct relationship to seedbed density; lower density resulted in a better plantation.)

15. MULLIN, R.E. 1981. A container and water dipping test for overwinter storage of black spruce. OMNR Nursery Note No. 75. 6 p.
(The polybin was successfully used for overwinter storage, and the stock should not be dipped in water previous to storage; moss was also not required in storage.)

16. MULLIN, R.E. and (C. CHRISTL). 1981. Morphological grading of white spruce nursery stock. For. Chron. 57: 126-130.
(3+0 seedling stock was found inferior to 2+2 stock in survival and growth: tentative recommendations are given for size of 2+2 stock as minimum 22 cm top length, minimum 4.0 mm stem diameter, minimum 5 ml root volume, and top-root ratio range (by volume) of 1.0 to 3.5:1.)

17. MULLIN, R.E. and R.E. HUTCHISON. 1981. The Dunemann option for Ontario. OMNR Nursery Note No. 73. 6 p.
(Very promising results have been obtained from Dunemann stock in comparison with regular nursery stock.)

18. MULLIN, R.E. and (R.E. LAUPERT). 1981. Cold and frozen overwinter storage of white pine at St. Williams Nursery. OMNR Nursery Note No. 70. 7 p.
(Results indicate that cool storage may be more suitable than frozen storage at St. Williams Nursery, but more tests are required for other species.)

19. PIERPOINT, G. 1981. Site types in the boreal mixedwood forest. In Proc. Boreal Mixedwood Symposium. R.D. Whitney and K.M McClain (Eds.) Canadian Forestry Service/OMNR. COJFRC Symp. Proc. O-P-9. pp. 10-16.
(Soil and vegetation characterists of three major divisions of the boreal mixedwood forest are described.)

20. PIERPOINT, G. 1981. (Contributor). Field manual for describing soils. Ontario Institute of Pedology, University of Guelph, Publication No. 81-4.
(A field guide for identifying and describing soil features and keying to interpretative classes. Replaced by field manual 81-5 below.)
N.B. Available from the Department of Land Resource Science, University of Guelph, Guelph, Ontario, Canada N1G 2W1. Cost: $15 plus mailing.

21. PIERPONT, G. 1981. (Contributor). Guide for describing key soil properties in the field. Ontario Institute of Pedology, University of Guelph, Publication No. 81-5.
(An expansion of the field manual 81-4 above. Now replaced by 1985 version. Write for more information.)
N.B. Available from the Department of Land Resource Science, University of Guelph, Guelph, Ontario, Canada N1G 2W1. Cost: $15 plus mailing.

22. PIERPOINT, G., J.M. PATERSON, J.G. BOUFFORD and C. GLERUM. 1981. Irregular growth of outplanted red pine. VI. The influence of handling and planting on fifth-year performance. OMNR Forest Res. Note No. 29. 4 p.
(Handling and planting procedures during field planting operations influenced survival, current height growth and total height, even after five years. Early monitoring of seedling quality as well as survival is possible and useful in assessing planting success.)

23. SKEATES, D.A. 1981. Stock production in Dewa blocks: an end product of seed research. In Proc. 1980 Provincial Nurserymen's Meeting, Dryden, Ont. pp. 147-153.
(The use of pregerminated seed with accelerated transplant and/or container production systems is described. Techniques are outlined for reducing variability in mass production of containerized coniferous stock.)

24. (WEBB, D.P.), S.J. COLOMBO and C. GLERUM. 1981. Cold hardiness in relation to bud morphogenesis in Picea glauca and P. mariana. Abstract in XIII International Botanical Congress,

Sydney, Australia, 21-28 Aug. 1981. p. 326.
(In black and white spruce, bud development and rate of shoot elongation were strongly correlated with cold hardiness, positively and negatively respectively.)

25. (WHITNEY, R.D) and K.M. McCLAIN (Eds.). 1981. Boreal Mixedwood Symposium. Canadian Forestry Service/OMNR. COJFRC Symp. Proc. O-P-9. 278 p.
N.B. Obtainable from the Great Lakes Forest Research Centre, Canadian Forestry Service, Box 490, Sault Ste. Marie, Ontario, Canada P6A 5M7
(The proceedings, comprised of 25 papers, reviews current management procedures and problems in Ontario's mixedwood forests, with the intent of stimulating interest in, and improvement of, the management of the Boreal Mixedwood Forest.)

26. (WYNIA, A.) and K.M. McCLAIN. 1981. How seedbed density can affect nursery stock costs. For. Chron. 57: 276-278.
(The benefits of variable seedbed density in the production of seedling stock are discussed in relation to cost. While certain improvements in seedling morphology may be derived from low seedbed densities, higher associated production costs must be ultimately justified by post-planting performance.)

27. ZSUFFA, L. and H.W. ANDERSON. 1981. The potential of poplar plantations. In Simposio Internacional sobre las Ciencias Forestales y su Contribucion al Desarrollo de la America Tropical. M. Chavarria (Ed.). San Jose, Costa Rica. pp. 99-109.
(Hybrid poplar management system in Ontario, the biomass yields and qualities, and the utilization potential are discussed in the new research and development experience in Ontario.)

28. ZSUFFA, L. 1981. The production of wood for energy. In Proc. XVII IUFRO World Congress, Division 3, Japan, 1981. pp. 403-413.
(A global review of the projects in energy plantations.)

29. ZSUFFA, L. 1981. Experiences in breeding Pinus strobus L. for resistance to blister rust. In Proc. XVII IUFRO World Congress, Division 2, Japan, 1981. pp. 181-183.
(The essential results of more than 20 years of work at Maple are summarized.)

1982

1. ANDERSON, H.W. 1982. Regenerating yellow birch with prescribed fire. Proc. SAF Convention, Fire Working Group, Cincinnati, Ohio. pp. 168-172.
(Yellow birch can be economically regenerated using prescribed fire. Experimental fall burning of tolerant hardwood stands prior to harvesting resulted in a 90% reduction in hard maple.)

2. ANDERSON, H.W. and L. ZSUFFA. 1982. Biomass growth and qualities of hybrid poplar. Paper presented to: 2nd Canadian Waferboard Symposium, Ottawa, Ont., 1-3 June, 1982. 24 p.
(Plantation management and clonal selection strategies are reviewed for hybrid poplar as a resource for wood-based industry. Poplar's genetic variability is considered as a basis for selecting superior clones for specified products.)

3. ANDERSON, H.W. and L. ZSUFFA. 1982. Genetically improved forest biomass energy production. Proc. Fourth Bioenergy R & D Seminar, National Research Council (ENFOR), Winnipeg, Man. pp. 392-394.
(The biomass productivity, quality and energy efficiency of forest tree species for energy production can be genetically improved by breeding and clonal selection.)

4. BAKER, W.D. 1982. Natural seed storage in serotinous cones of Pinus banksiana. In Proc. IUFRO Symp. Forest Tree Seed Storage, Petawawa, Ont., Sept. 1980: 81-90.

5. COLOMBO, S.J. 1982. The shoot growth habit peculiar to second-year pine seedlings. In Proc. Canadian Containerized Tree Seedling Symposium. J.B. Scarratt, C. Glerum and C.A. Plexman (Eds.). Environment Canada, Can. For. Serv. COJFRC Symp. Proc. 0-P-10. p. 433.
(Second-year shoot growth in jack pine seedlings was accomplished primarily by the extension of stem internodes below the first-year bud.)

6. COLOMBO, S.J. 1982. Winter damage to container seedlings: Consequences and prevention. Proc. OMNR Nurserymen's Meeting, Thunder Bay, Ont., 7-11 June 1982. pp. 10-23.
(The deleterious effects of winter damage to the quality of black spruce and jack pine container stock are presented, and the use of a new hardening regime called Extended Greenhouse Culture to reduce levels of damage is outlined.)

7. COLOMBO, S.J., C. GLERUM and (D.P. WEBB). 1982. Bud development in black spruce container stock. OMNR Forest Res. Note No. 32. 5 p.
(Artificial shading and extended greenhouse culture are suggested as treatments which will promote bud development while allowing cold hardiness to increase before exposure to freezing temperatures.)

8. COLOMBO, S.J., (D.P. WEBB) and C. GLERUM. 1982. Cold hardiness and bud development under short days in black and white

spruce seedlings. In Proc. Canadian Containerized Tree Seedling Symposium. J.B Scarratt, C. Glerum and C.A. Plexman (Eds.). Environment Canada, Can. For. Serv. COJFRC Symp. Proc. O-P-10. pp. 171-176.
(Cold hardiness of first-year seedlings of black and white spruce was increased by exposure to 8-hr photoperiod at 20°C before moving them outside.)

9. FORSLUND, R.R. 1982. A geometrical tree volume model based on the location of the centre of gravity of the bole. Can. J. For. Res. 12(2): 215-221.

10. GLERUM, C. 1982. A bud development study on one-year-old container-grown conifer seedlings, pp. 14-16. In Proc. Electron Microscopy Symposium, 3 February 1982, Toronto, Ont. Ontario Ministry of the Environment.
(Bud development in containerized black spruce seedlings was improved by changing the cultural practices. This resulted in reduced overwinter losses, which were as high as 50% to less than 1%, and enhances subsequent field performance.)

11. GLERUM, C. 1982. Frost hardiness and dormancy in conifers. Proc. of Northeastern area nurserymen's conference, Halifax, N. S. Dept. Lands and Forests, Truro, N.S. pp. 37-46.
(Frost hardiness and dormancy of trees are briefly discussed as well as their possible relationship. The importance of these two physiological processes in nursery cultural techniques is pointed out.)

12. GLERUM, C. and J.M. PATERSON. 1982. Performance of container-grown and bare-root jack pine three years after outplanting on a northern Ontario cutover. In Proc. Canadian Containerized Tree Seedling Symposium. J.B. Scarratt, C. Glerum and C.A. Plexman (Eds.). Environment Canada, Can. For. Serv. COJFRC Symp. Proc. O-P-10. p. 438.
(More than 3 years are required before a final assessment can be made when comparing bare-root and container stock on a specific site.)

13. GORDON, A.G. 1982. Genetics and genecology of spruce, Sault Ste. Marie, Ontario, 1979 and 1980. In Proc. 18th Meeting Can. Tree Improvement Assoc., Part 1. D.F.W. Pollard, D.G. Edwards, and D.W. Yeatman (Eds.). Duncan, B.C., 17-20 Aug. 1981. pp. 112-115.
(Outlines the progress in forest genetics and tree improvement in intra- and interspecific hybridization and clonal propagation in spruce.)

14. GORDON, A.G. 1982. The consequences of full-tree logging and biomass harvesting relative to maintaining forest ecosystem stability. Panel on Soil, Site and Watershed Protection. Ont. Professional Foresters Assoc. Annual Meeting, Sault Ste. Marie, Ont., 29 Jan. 1982.
(Describes the nutrient cycle, and factors affecting the availability of nutrients for seedling growth. Boreal upland mixedwood sites have much greater resilience than do black spruce stands. How and what is harvested will have substantial effects on subsequent rotation cycles.)

15. (GUINON, M.), J.V. HOOD and (W.J. LIBBY). 1982. A clonal study of intraspecific variability in radiata pine. Aust. For. Res. 12. pp. 191-201.

16. (HAAVISTO, V.F.) and A.G. GORDON. 1982. Flushing black and white spruce flowers an an aid in predicting cone crops. Canadian Forestry Service, Environment Canada/OMNR Leaflet. (Unnumbered.)
(Identifies and describes periodicity, growth habit and sex of black and white spruce flowers, and provides a simple method of forced flushing for evaluation of potential cone crops, budworm damage, etc.)

17. HO, R.H. 1982. Haploid plant culture in poplar. In Physiology and Genetics of Intensive Culture. B.A. Thieges (Ed.). Proc. 7th North American Forest Biology Workshop, University of Kentucky, Lexington, Kentucky. pp. 210-213.
(This study reports the successful induction of haploid plantlets through anther culture in poplar.)

18. (JEGLUM, J.K., R. ARNUP, R.K. JONES), G. PIERPOINT (and G.M. WICKWARE). 1982. Forest ecosystem classification in Ontario's Clay Belt: a case study. In Artificial Regeneration of Conifers in the Upper Great Lakes Region. G.D. Mroz and J.F. Berner (Eds.). Proc. Michigan Technical University, Houghton, Michigan. pp. 111-128.

19. (LATIMER, F.) and D.A. SKEATES. 1982. Seed storage in Ontario. In Proc. IUFRO Symp. Forest Tree Seed Storage, Petawawa, Ont., Sept. 1980: 6-12.
(This paper describes the functions of the Ontario Tree Seed Plant, which supports the provincial reforestation program.)

20. McCLAIN, K. 1982. Growth, nutrition and root development of Ontario tubelings, plugs and 3+0 bare-root black spruce. In Proc. Containerized Tree Seedling Symposium. J.B. Scarratt, C. Glerum and C.A. Plexman (Eds.). Environment Canada, Can. For. Serv. COJFRC Symp. Proc. 0-P-10. pp. 331-341.
(Young stands were examined and their growth, nutrition and root development were compared. Bare-root stock outperformed the other two stock types.)

21. MULLIN, R.E. and C. CHRISTL. 1982. Morphological grading of white pine nursery stock. For. Chron. 58(1): 40-43.
(3+0 seedling stock was inferior to 2+2 stock in survival and growth: tentative recommendations were given for size of 2+2 stock as minimums of 20 cm for top length, 0.40 cm for stem diameter, 12 ml for root volume, and a top-root ratio less than 3.5:1.)

22. MULLIN, R.E. and J.S. LUCAS. 1982. Overwinter storage tests of larch and tamarack. OMNR Nursery Note No. 76. 7 p.
(No significant differences were found between fall-stored and fresh spring-lifted stock with respect to survival, height or terminal growth.)

23. MULLIN, R.E. and T.R. MYLAND. 1982. Tests of time of lifting, dipping, and containers for overwinter storage at Dryden Nursery. OMNR Nursery Note No. 77. 7 p.
(Cardboard carton was as good as the Kraft-polyethylene bag

for overwinter storage. Water dipping of tree roots prior to storage was of no benefit.)

24. PAPADOPOL, C.S. 1982. Some effects of water supply on the accumulation of poplar biomass and energy budget. In North American Poplar Council, 17th Annual Meeting, Rhinelander, Wisconsin, 20-22 July 1982. pp. 84-91.
(Yields of four eight-year-old Populus x euramerica clones subjected to different water supply regimes are reported. Biomass accumulation was strongly influenced by irrigation.)

25. (RAUTER, R.M.) and J.V. HOOD. 1982. Uses for rooted cuttings in tree improvement programs. In Seed Orchards and Strategies for Tree Improvement. Proc. 18th Meeting Can. Tree Improvement Assoc., Part 2, Duncan, B.C., 17-20 Aug. 1981. pp. 82-91.

26. SAUL, G.H. and L. ZSUFFA. 1982. Vegetative propagation of alder (Alnus glutinosa L.) by rooted cuttings. OMNR Forest Res. Note No. 33. 3 p.
(Lignified and green cuttings of European alder can be rooted without difficulty under greenhouse conditions.)

27. (SCARRATT, J.B.), C. GLERUM (and C.A. PLEXMAN) (Eds.). 1982. Proc. Canadian Containerized Tree Seedling Symposium. Environment Canada, Can. For. Serv. COJFRC Symp. Proc. 0-P-10. 460 p.
(This symposium reviews the production and use of containerized planting stock for northern tree species, and the effectiveness of container planting as a reforestation method.)

28. SKEATES, D.A. 1982. Cone collection tower. OMNR Forest Res. Note No. 30. 4 p.
(This note describes a portable cone collection tower for seed collection from the crowns of standing trees in accessible forest areas.)

29. SKEATES, D.A. 1982. Touring the "Land of Opportunity". In Proc. IUFRO Symp. Forest Tree Seed Storage, Petawawa, Ont., Sept. 1980: 228-235.
(Tours of the more accessible developing northern Ontario forest, and of the more developed south, were conducted for the IUFRO Working Party on Seed Problems.)

30. SKEATES, D.A., D.E. IRVING and L. FORCIER. 1982. Pilot studies of black spruce germinant transplants in northern Ontario. OMNR Nursery Note No. 79. 9 p.
(Studies were conducted on the feasibility of implementing a two-year accelerated transplant system for black spruce on an operational scale. Pregermination, type of growing medium, greenhouse environment and transplant date are discussed.)

31. vanBORRENDAM, W. and D.A. SKEATES. 1982. White spruce gene pool conservation in southern Ontario. OMNR Forest Res. Note No. 31. 4 p.
(Recommendations are made to ensure the conservation of promising populations to help improve the productivity of Southern Ontario's future forests.)

32. ZSUFFA, L. 1982. Biomass Production for Energy in Canada. Presented to the 2nd session of the Ad-Hoc Committee on Biomass Production Systems in Salicadeae, International Poplar Commission, FAO, Casale Monferrato, Italy, 6-10 Sept. 1982. FO:CIP:BS/82/2. 5 p.
(This report describes the potential contribution of biomass energy, especially from poplar, to Canada's plans for energy self-sufficiency by 1995.)

33. ZSUFFA, L. and D. MORGAN. 1982. The use of Populus and Salix biomass for energy--a survey of International Poplar Commission countries. Presented to the Ad-Hoc Committee on Biomass Production Systems in Salicaceae, International Poplar Commission, Casale Monferrato, Italy, 6-10 Sept. 1982. FO:CIP: BS/82/2. 12 p.
(This report presents the results of a survey of the present and planned sources of energy, and especially the use of Populus and Salix biomass for energy, in member countries of the International Poplar Commission.)

1983

1. ANDERSON, H.W. 1983. High speed forestry in Ontario (or, how I learned to stop worrying and love a weed). In G.I.R.M.S., Vol. 14. Department of Geography, Sir Wilfrid Laurier University, July 1983. pp. 43-62.
(Fast-growing hybrid poplars can produce high yields in minimum time. Breeding and clonal development are described, along with efficient cultural techniques such as interplanting, short-rotation, mini-rotation, and mixed plantations. End uses include fibre, food, energy, and chemicals.)

2. ANDERSON, H.W. and L. ZSUFFA. 1983. Hybrid poplar energy plantations in Ontario. Proc. ENERGO '83, Ontario Ministry of Energy, Toronto, Ont. pp. 134-145.
(Intensively-managed short-rotation plantations of genetically improved fast-growing trees can make significant contributions to energy supplies.)

3. ANDERSON, H.W., C.S. PAPADOPOL and L. ZSUFFA. 1983. Wood energy plantations in temperate climates. In Forest Ecology and Management--An International Journal. Elsevier. 42 p.
(Biological factors, methods of genetic improvement, and cultural treatments influencing productivity are discussed. Biomass yields, energy contents and ratios, production economics and conversion methods are reviewed.)

4. BECKWITH, A.F., P. ROEBBELEN and (V.G. SMITH). 1983. Red pine plantation growth and yield tables. OMNR Forest Res. Rep. No. 108. 110 p.
(The main table projects yields of planted red pine five years after various thinning intensities for a range of sites and ages. Other tables include present yield, normal yields of unthinned stands, individual tree volume and site index.)

5. BUCHERT, G.P. 1983. Winter hardiness assessment in seedlings of pure and hybrid pitch pine. In Proc. 28th Northeastern Forest Tree Improvement Conf., R.T. Eckert (Ed.). Univ. of New Hampshire, Durham, N.H., 7-9 July 1982. pp. 94-101.
(Open-pollinated families from 25 stands in 15 geographic areas as well as selected backcross combinations were assessed for winter survival in southern Ontario. Implications for tree breeding are discussed.)

6. BURGER, D. 1983. Service report of consultancy in forest soils, Forest Research Institute, Yezin, Burma. FAO Contract No. DP/BUR/72/004-1/FO. July-Sept. 1982. Mimeo 24 p.
(Principles and techniques for a proposed forest site classification program, including four projects. Provisional forest site regions of Burma are described. Recommendations are made regarding research quality and administration.)

7. (DANZMANN, R.G.) and G.P. BUCHERT. 1983. Isozyme variability in central Ontario jack pine. In Proc. 28th Northeastern Forest Tree Improvement Conf., R.T. Eckert (Ed.). Univ. of New Hampshire, Durham, N.H., 7-9 July 1982. pp. 232-248.
(The high isozyme variability found within a small geographic

area of jack pine was similar to that found in other conifer species sampled over a much wider area, and has implications for operational jack pine breeding programs.)

8. DRYSDALE, D.P., D. MORGAN and L. ZSUFFA. 1983. Energy plantations--the present situation and plans for 1983-1988. In Proc. workshop held by IEA Forestry Energy Programme, Short Rotation Forest Biomass--Production Technology and Mechanization. Per Olov Nilsson and L. Zsuffa (Eds.). 11 Oct. 1982, Vettre, Norway. pp. 3-11.
(This paper presents some conclusions drawn from a survey of countries cooperating in the Forest Energy Program of the International Energy Agency.)

9. FAYLE, D.C.F. 1983. Differences between stem and root thickening at their junction in red pine. Plant and Soil 71: 161-166.
(The cyclical changes in thickening between stem and root where they conjoin are brought about more by changes in moisture availability than by other factors.)

10. FAYLE, D.C.F., D. MacIVER and C. BENTLEY. 1983. Computer graphing of annual ring widths during measurement. For. Chron. 59: 291-293.
(Annual ring width data produced by the DIGI-MIC tree ring measurer are transmitted to an Apple II Plus microcomputer for immediate display of the radial growth pattern. Values are stored for further analysis. Computational and graphics programs for PDP 11/23 are being transferred to Apple IIe with graphics on a Hewlett Packard HP7470A plotter.)

11. GORDON, A.G. 1983. Nutrient cycling dynamics in differing spruce and mixedwood ecosystems in Ontario and the effects of nutrient removals through harvesting. In Resources and Dynamics of the Boreal Zone. R.W. Wein, R.R. Riewe and I.R. Methven (Eds.) Association of Canadian Universities for Northern Studies, Ottawa. pp. 97-118.
(Nutrient cycling and productivity of black spruce on peat and moist outwash sand are compared with moderate and high productivity boreal mixedwood ecosystems and north temperate spruce ecosystems. The importance of choosing methods for harvesting which conserve nutrients is discussed.)

12. HO, R.H. 1983. Wood energy plantations: the state of art and the potential of biotechnology in forest tree improvement. IEA/FE PG'B', Report 1983: 2. 30 p.
(A discussion of genetic manipulation that may lead to practical application in forestry, including ovule and embryo culture; in vitro pollination; cloning of forest trees; production of virus-free clones, resistant trees, haploids, triploids, and somatic hybrids; and genetic engineering.)

13. HO, R.H., A.Y. RAJ and L. ZSUFFA. 1983. Poplar plants through anther culture. In Proc. 28th Northeastern Forest Tree Improvement Conf., R.T. Eckert (Ed.). Univ. of New Hampshire, Durham, N.H., 7-9 July 1982. pp. 294-300.
(Clones of several poplar species and interspecific hybrids were subjected to anther culture for production of haploids. Experiments using different kinds of plant growth regulators and different combinations of cytokinins and auxins are reported.)

14. (JONES, R.K.), G. PIERPOINT, (G.M. WICKWARE and J.K. JEGLUM). 1983. A classification and ordination of forest ecosystems in the Great Clay Belt of northwestern Ontario. In Resources and Dynamics of the Boreal Zone. R.W. Wein, R.R. Riewe and I.R. Methven (Eds.). Proc. of conference held at Thunder Bay, Ont., Aug. 1982. Assoc. of Canadian Universities for Northern Studies, Ottawa.

15. (JONES, R.K.), G. PIERPOINT, (G.M. WICKWARE, J.K. JEGLUM, R.W. ARNUP and J.M. BOWLES). 1983. Field guide to forest ecosystem classification for the Clay Belt Site Region 3E. With Agriculture Canada and Environment Canada. 127 p.
(This field guide helps the user to recognize vegetation and soil features in forest stands and to allocate any stand to one of 14 Operational Groups within the classification.)
N.B. $15 charge per copy to users other than universities, colleges or government institutions. Cheque or money order payable to The Treasurer of Ontario.

16. LARSSON, H.C. 1983. A silvicultural planting key for lowland sites in southern Ontario. For. Res. Info. Paper No. 103. 35 p.
(This aid for reforesting lowland sites covers such factors as elevation, pH, plant cover types, drainage and silvicultural treatments. The key incorporates recommendations about tree species, post-planting care, animal damage, and probable planting results. Glossary.)

17. MORGAN, D., (M. NEENAN) and L. ZSUFFA. (Eds.) 1983. Forest biomass energy and its potential. IEA/FE PG'B', Report 1983: 7. 16 p.
(This brochure summarizes the activities of Programme Group B: Biomass Growth and Production Program in maximizing efficiency in energy production by optimizing the growth of selected species in energy plantations.)

18. MULLIN, R.E. 1983. A test of the polybin for frozen overwinter storage of red pine. U.S. For. Serv., Tree Planters' Notes 34(1): 3-6.
(The polybin was as successful as the regular Kraft-polyethylene bag for frozen overwinter storage of red pine. Dipping of tree roots before packaging was not advisable.)

19. ONTARIO MINISTRY OF NATURAL RESOURCES, ONTARIO TREE IMPROVEMENT AND FOREST BIOMASS INSTITUTE. 1983. Annual Report--Forest Research 1981-1982. 43 p.

20. PAPADOPOL, C.S. and (C.R. SILVERSIDES). 1983. Stand establishment of fast growing species for energy plantations. In Short Rotation Forest Biomass--Production Technology and Mechanization. Per Olov Nilsson and Louis Zsuffa (Eds.). Proc. workshop held by IEA Forestry Energy Programme, Vettre, Norway, 11 Oct. 1982. Swedish Univ. of Agric. Sci., Dept. of Operational Efficiency, Internal Report No. 229. pp. 43-58.
(This report describes the role of stand establishment technology in increasing the productivity of energy forests under temperate climatic conditions. Emphasis is placed on inexpensive biological solutions.)

21. RACEY, G.D., C. GLERUM and R.E. HUTCHISON. 1983. Effects of packaging on field performance of fall- and spring-lifted jack pine at Swastika Nursery. OMNR Nursery Note No. 88. 5 p.
(Trials were conducted to assess the effects of storage of 2+0 jack pine in Kraft bags or burlap bales, with or without water dipping, on the survival and growth of the stock after ouplanting. Fall-lifted trees were held in frozen overwinter storage; spring-lifted trees were placed in either cold or frozen storage.)

22. RACEY, G.D., C. GLERUM and R.E. HUTCHISON. 1983. Cold and frozen overwinter storage of white cedar. OMNR Nursery Note No. 90. 6 p.
(Outplanting tests were conducted following overwinter storage of 2+1 white cedar. Trees were cold- or frozen-stored in Kraft bags before planting, and treatments were compared on the basis of second-year survival and height growth.)

23. RACEY, G.D., C. GLERUM and R.E. HUTCHISON. 1983. The practicality of top-root ratio in nursery stock characterization. For. Chron. 59: 240-243.
(Top length, stem diameter, top volume and root volume are all better indicators of nursery stock quality and potential growth performance than top/root ratio.)

24. RACEY, G.D. and R.E. HUTCHISON. 1983. Overwinter storage of white pine at St. Williams Nursery. OMNR Nursery Note No. 86. 5 p.
(Fourth-year survival and growth of 3+0 white pine held overwinter in either frozen or cold storage is presented. Results of outplanting are discussed and a DHD value for fall lifting and storage is recommended.)

25. RACEY, G.D. and R.E. HUTCHISON. 1983. Overwinter storage of Scotch pine at St. Williams Nursery. OMNR Nursery Note No. 87. 4 p.
(2+0 Scotch pine seedlings were outplanted following overwinter cool storage at +1°C storage or frozen storage at -3°C. The effects of storage and two dates of lifting were evaluated on the basis of second-year survival and growth, and are compared to degree-hardening-day accumulation.)

26. RACEY, G.D. and R.E. HUTCHISON. 1983. A field test of the snow cache with 2+2 white spruce from Swastika Nursery. OMNR Nursery Note No. 89. 4 p.
(Experiments were conducted to test the effectiveness of the snow cache for overwinter storage of 2+2 white spruce. Overwintered seedlings were outplanted on two dates and analyzed after two years for height growth and survival.)

27. RACEY, G.D. and R.E. HUTCHISON. 1983. Root soaking, plant moisture stress and second year field performance of three coniferous species. OMNR Nursery Note No. 91. 7 p.
(The effects of root soaking and frozen overwinter storage on the plant moisture stress, survival and height growth of white spruce (1.5+1.5), red pine (3+0), and white pine (3+0) seedlings were examined in terms of second-year height growth and survival following outplanting.)

28. RACEY, G.D. and R.E. HUTCHISON. 1983. A comparison of some spring holding options for red pine. OMNR Nursery Note No. 95. 5 p.
(Storage treatments of 3+0 red pine were compared on the basis of fifth-year survival and height after planting. Trees were either stored in a shaded area with roots submerged in water, packed in Kraft bags and refrigerated, or heeled-in and kept in full or partial shade.)

29. RACEY, G.D., R.E. HUTCHISON and C. GLERUM. 1983. A comparison of kraft bags and polybins for overwinter frozen storage of white spruce. OMNR Nursery Note No. 92. 4 p.
(The effects of various storage procedures for 2+2 white spruce seedlings were compared using fifth-year survival and height growth following outplanting.)

30. RACEY, G.D., R.E. HUTCHISON and C. GLERUM. 1983. A white pine age-class comparison with variations in site and planting methods. OMNR Nursery Note No. 93. 6 p.
(A study was conducted to examine the effect of age-class on the survival and growth of 3+0, 1+2, 2+1 and 2+2 white pine.)

31. RACEY, G.D. and E. RAITANEN. 1983. Seedling development as affected by fibre and straw mulching at Midhurst Nursery. OMNR Nursery Note No. 94. 5 p.
(The use of sawdust, straw and fibre mulches in newly sown seedling beds was examined. Mulches were compared on the basis of seedling germination rate, stem diameter and oven-dry weight of 1+0 red pine, white pine and Norway spruce.)

32. RAJ, A.Y. 1983. Application of tissue and anther culture methods in Populus breeding. XV International Congress Genet. New Delhi, India. 12-21 Dec. 1983. Oxford and IBH Pub. Ca. New Delhi (Abstract). p. 424.

33. RAJ, A.Y., R.H. HO and L. ZSUFFA. 1983. In vitro propagation of forest trees by tissue culture. In Proc. 28th Northeastern Forest Tree Improvement Conf., R.T. Eckert (Ed.). Univ. of New Hampshire, Durham, N.H., 7-9 July 1982. pp. 281-293.

34. SAUL, G.H. and L. ZSUFFA. 1983. The use of small scions and bare-root stock in grafting white pine. OMNR Forest Res. Note No. 34. 3 p.
(This note describes grafting trials with small scions and bare-root or potted stock. Small scions can be grafted successfully, though survival is lower on bare-root stock.)

35. SKEATES, D.A. 1983. Pregermination: A key to early vigour in artificial silvicultural systems. In Proc. Northeastern Nurserymen's Conf., Halifax, N.S., July 1982.
(Advantages of pregermination systems are described, along with operational techniques.)

36. STROEMPL, G. 1983. Growth response of basswood and sugar maple to an intermediate cutting. OMNR Forest Res. Report No. 107. 19 p.
(To keep basswood in a mixed stand, interference must come within the first two decades of stand development. Later cuttings only accelerate the natural decline in basswood.)

37. ZSUFFA, L. 1983. Forest biomass energy production for the North. In Alaska/Canada North--Neighbours in Science--34th Alaska Science Conference, Arctic Division--AAAS, Symposium on Towards Energy Self-Sufficiency in the North: Energy Conservation and Forest Biomass, Whitehorse, Yukon, 28 Sept.-1 Oct. 1983. 12 p.
(Northern sites with potential for cultivation and utilization for growing poplars and willows can be used for wood energy production. Experience and planting stock developed in Scandinavia and Canada can be applied to this purpose.)

38. ZSUFFA, L. 1983. Genetics in intensive silviculture. Weyerhaeuser Lecture, University of Toronto, 17 Nov. 1983.
(This lecture presents a fundamental method for increasing forest productivity: the use of better trees. The history, methodology and prospects for forest tree breeding in Ontario are described.)

39. ZSUFFA, L. 1983. Aspects of short rotation forest farming in Canada. In Proc. Bereitstellung und Verwertung von Lignocellulosen - Entwicklunsstand und Perspektiven - Status - und Expertenseminar/Workshop (Workshop on Preparation and Utilization of Lignocelluloses--State of Development and Perspectives). Julich, W. Germany, 20-22 Nov. 1983. pp. 101-129.
(This article describes the development and results of programs in short-rotation forest farming of fast-growing deciduous trees, with emphasis on hybrid poplar. Short rotation and mini-rotation approaches using coppicing or cuttings on prime as well as marginal farmland are given.)

40. ZSUFFA, L. and D. MORGAN. 1983. Forest biomass energy production --a five year retrospect of the work of Programme Group 'B'. IEA/FE PG'B', Report 1983: 6. 69 p.
(This report describes work since April 1978 within the International Energy Agency's programme group for biomass growth and production. Results, constraints, perspectives. Lists of actions, projects, cooperators and reports.)

1984

1. ANDERSON, H.W. and L. ZSUFFA. 1984. Genetically improved hardwoods as a potential energy source in Ontario. In Proc. Energex 84: The Global Energy Forum, Regina, Sask. p. 211-214.
(Clones of Populus (poplar) and Salix (willow) are being developed which adapt to a variety of sites and management systems and show consistently high productivity, characterized by such features as energy content, wood density, tissue composition and chemical components.)

2. ANDERSON, H.W. and L. ZSUFFA. 1984. Biomass growth and qualities of hybrid poplar. In Proc. 1982 Canadian Waferboard Symposium, Ottawa, Ont., 1-3 June, 1982. Forintek Canada Spec. Publ. SP508E. pp. 197-200.
(Hybrid poplar plantations managed on sustained yield with short rotations and high productivity could alleviate supply problems. Plantation management techniques and clonal selection strategies are discussed.)

3. ANDISON, D., P. ROEBBELEN and A.F. BECKWITH. 1984. Initial thinning in a semi-mature white and red pine stand. OMNR Forest Res. Note No. 35. 4 p.
(In a comparison of three thinning methods, a fairly heavy selection thinning produced the greatest volume in large-diameter trees and resulted in the greatest absolute increase in total volume.)

4. BECKWITH, A.F., P. ROEBBELEN and S. PESSIONE. 1984. Variable-density growth and yield of managed jack pine plantations. Proc. COJFRC Jack Pine Symposium, Oct. 1983, pp. 145-156.
(Permanent sample plots and stem analysis information have been used to compare jack pine (Pinus banksiana Lamb.) in plantations and natural stands.)

5. BECKWITH, A.F., P. ROEBBELEN and (V.G. SMITH). 1984. Manual of red pine plantation growth and yield tables. Abbreviated from OMNR Forest Res. Rep. No. 108. 56 p.
(Growth and yield tables allow manager to forecast outcome of various thinning regimes. Tables give information on present yield, normal yield of unthinned stands, individual tree volume, site index, and projected yields after thinning.)

6. COLOMBO, S.J. 1984. Acclimatizing and overwintering spruce container stock. Nurserymen's Meeting, G. Howard Ferguson Forest Station, Kemptville, Ont., 13-17 June 1983. pp. 79-81.
(Proper hardening with extended greenhouse culture should result in seedlings which have good second-year growth potential due to well-developed buds, and which are resistant to both fall frosts and winter dessication.)

7. COLOMBO, S.J. 1984. Shoot morphology of winter-damaged black spruce container seedlings. OMNR Forest Res. Note No. 36. 3 p.
(Variations in first-season shoot morphology associated with

winter damage in a black spruce paperpot seedling crop are analyzed. Taller seedlings with longer lateral shoots sustained more damage. Extended Greenhouse Culture is recommended.)

8. COLOMBO, S.J. and C. GLERUM. 1984. Winter injury to shoots as it affects root activity in black spruce container seedlings. Can. J. For. Res. 14: 31-32.
(Reduced levels of root activity were associated with winter injury to shoots of 1-year-old black spruce (Picea mariana (Mill.) B.S.P.) container seedlings.)

9. COLOMBO, S.J. and K.D. ODLUM. 1984. Bud development in the 1982-83 overwintered black spruce container seedling crop. OMNR Forest Res. Note No. 38. 4 p.
(Some factors affecting bud development are discussed. Current levels of bud development are documented to provide baseline data for nurserymen to evaluate stock quality.)

10. COLOMBO, S.J. and W.A. SMITH. 1984. Delayed bud initiation in black spruce container seedlings due to accidental daylength extension. OMNR Forest Res. Note No. 37. 4 p.
(Long wavelength lights near a greenhouse may delay bud initiation, leading to a lack of uniformity in hardening within the greenhouse.)

11. COLOMBO, S.J., (D.P. WEBB) and C. GLERUM. 1984. Frost hardiness testing: An operational manual for use with extended greenhouse culture. OMNR Forest Res. Rep. No. 110. 14 p.
(Procedures and equipment are described for monitoring the frost hardiness of container-grown seedlings in preparation for overwintering outside. Guidelines are presented for the Extended Greenhouse Culture method of hardening spruce container seedlings.)

12. (DURYEA, M.L.) and K.M. McCLAIN. 1984. Altering seedling physiology to improve reforestation success. In Seedling Physiology and Reforestation Success. M.L. Duryea and G.N. Brown (Eds.). Martinus Nyhoff/Dr. W. Junk, publishers.

13. GORDON, A. 1984. Genetics, genecology and tree improvement of spruce in 1981 and 1982, Sault Ste. Marie, Ontario. In Proc. 19th Meeting Can. Tree Improvement Assoc., Part 1. Toronto, Ont., 22-26 Aug. 1983. pp. 94-97.
(Current studies are outlined, with emphasis on interspecific hybridization and clonal propagation of hybrids.)

14. HO, R.H. 1984. Research on seed-cone receptivity, cone induction, and in vitro culture. In Proc. 19th Meeting Can. Tree Improvement Assoc., Part 1. Toronto, Ont., 22-26 Aug. 1983. pp. 98-101.
(Pollination studies in black and white spruce are described. Also reported: research on the enhancement of cone production by chemical and mechanical methods, on haploid plant culture, and on in vitro propagation.)

15. HO, R.H. 1984. Seed-cone receptivity and seed production potential in white spruce. For. Ecol. Manag. 9: 161-171.
(The optimal seed-cone stage for controlled pollination in

white spruce appeared to occur when the seed cones approached the end of receptivity and this coincided with the peak of pollen shedding. Seed cones pollinated at this stage produced the most filled seeds.)

16. HO, R.H. 1984. Production of important hybrids from sexually incompatible species by ovule and embryo culture, and protoplast fusion. IEA-For. Energy PG'B'--Biomass Growth and Production PG'B' Mtg., Uppsala, Sweden. 18 p.
(This report presents a collection of references to facilitate studies in producing hybrids of incompatible species by in vitro techniques.)

17. ODLUM K.D. and S.J. COLOMBO. 1984. A comparison of three antitranspirants for reducing water loss in black spruce container seedlings. OMNR Nursery Note No. 110.
(Three commercially available antitranspirants, Vapor Gard, Clearspray, and Folicote, were tested at their recommended rates. Vapor Gard holds the greatest promise as an antitranspirant for nursery and field use.)

18. PAPADOPOL, C.S. 1984. The atmospheric demand for evapotranspiration: a reliable means for irrigation rate calculation. Nurserymen's Meeting, G. Howard Ferguson Forest Station, Kemptville, Ont., 13-17 June 1983. pp. 85-97.
(Atmospheric demand for evapotranspiration can be used to estimate irrigation water requirements in tree nurseries. A sound irrigation scheduling system has to integrate climatic, crop, and soil data, and use the latest achievements of micrometeroology and soil science.)

19. PAPADOPOL, C.S. 1984. An integrated irrigation system for forest nurseries in Ontario. ASAE Paper 84-2619. 23 p.
(Automated weather stations provide hourly data to an Apple III microcomputer system for daily estimation of irrigation rates based on potential evapotranspiration. Short- and long-term research applications are outlined.)

20. PAPADOPOL, C.S. 1984. The renovation of waste water combined with intensive silviculture. ASAE Paper 84-2647. 10 p.
(A system of waste-water renovation based on recycling through forest plantations is proposed. Recycling rates compare favourably with effluent disposal over grass. Plantation characteristics and operation criteria are outlined, along with ecological advantages.)

21. PATERSON, J.M. and D.C.F. FAYLE. 1984. Early prediction of plantation performance for red pine. For. Chron. 60(6): 340-344.
(Early prediction of the relative performance at five years of 3+0 red pine plantations can be obtained by supplementing height and survival measurements with a quality assessment based on needle length and growth characteristics of the terminal shoot in the first two years after outplanting.)

22. RACEY, G.D., L. BOWDERY and C. GLERUM. 1984. Root volume for characterization of nursery stock. OMNR Nursery Note No. 102. 6 p.
(This report examines the use of root volume measurements as

an alternative to root area index (RAI) for the characterization of nursery stock.)

23. RACEY, G.D. and R.E. HUTCHISON. 1984. A field test of 3 red pine age-classes. OMNR Nursery Note No. 106.
(The performance after planting of three age-classes of red pine stock, 3+0, 2+0, and 1+2, under low competition conditions, was compared.)

24. RACEY, G.D., R.E. HUTCHISON and C. GLERUM. 1984. Effect of extended cold storage after overwinter frozen storage of white pine and white spruce. OMNR Nursery Note No. 105.
(A trial was held to determine the length of time 2+2 white spruce and 3+0 white pine could be held in cold storage after thawing without a significant reduction in outplanting survival and height growth.)

25. ROEBBELEN, P. and (V.G. SMITH). 1984. An investigation of product form. Can. J. For. Res. 14(6): 768-774.

26. (ROLLER, K.). 1984. A guide to the identification of poplar clones in Ontario. 112 p.
(A simple and precise key for the identification of 32 Ontario-grown poplar clones, using photographs and illustrations to distinguish their characteristics. A practical classification tool for poplar growers.)

27. SKEATES, D.A. 1984. Ontario forest tree seed research and development 1981-83. In Proc. 19th Meeting Can. Tree Improvement Assoc., Part 1. Toronto, Ont., 22-26 Aug. 1983. pp. 111-114.
(Several research studies are described, leading to intensive forest management systems using improved quality nursery stock. Studies relate to seed source, yield and quality; seed production and collection; and seed utilization.)

28. STROEMPL, G. 1984. Thinning clumps of northern hardwood stump sprouts to produce high quality timber. OMNR Forest Res. Information Paper No. 104. 27 p.
(This information paper summarizes types of sprout development and recommends how to thin clumps of sprouts to encourage rapid regrowth and maximum growth of selected trees.)

29. vanBORRENDAM, W. 1984. Identification of remnant white spruce in southern Ontario: a basis for gene conservation. OMNR Forest Res. Rep. No. 109. 20 p.
(A survey of natural remnants of white spruce stands in southern Ontario resulted in the identification of fourteen major groups or gene pools. Seed or scion material should be collected from each and clonal archives should be established to ensure the conservation of promising populations.)

30. ZSUFFA, L. 1984. Breeding fast growing hardwoods and white pines at Ontario Tree Improvement and Forest Biomass Institute, Maple, Ont., during 1981-1983. In Proc. 19th Meeting Can. Tree Improvement Assoc., Part 1. Toronto, Ont., 22-26 Aug. 1983. pp. 115-118.
(Experiments are being carried out in breeding native and

balsam poplar, aspen, white pine, willow, alder and birch. Selection, hybridization, and progeny and clonal trials are described.)

31. ZSUFFA, L. and D. MORGAN. 1984. Populus and Salix biomass for energy: a survey of International Poplar Commission countries. Unasylva 36 (1984/3): 31-33.
(A survey of present use and future plans in Australia, Canada, France, Hungary and India.)

32. ZSUFFA, L., A. MOSSELER and Y. RAJ. 1984. Prospects for interspecific hybridization in willow for biomass production. In Ecology and Management of Forest Biomass Production Systems. K. Perttu (Ed.). Dept. Ecol. & Environ. Res., Swed. Univ. Agric. Sci., Report 15. pp. 261-281.
(This article discusses some of the biological features of the genus Salix related to breeding for increased annual yields of biomass for energy purposes.)

1985

1. ANDERSON, H.W., (J.J. BALATINECZ), C.P. CHEN, and (D.N. ROY). 1985. Internal biomass characteristics for efficient energy conversion. In Proc. Joint Workshop of IEA/FE, Programme Groups B, C, and D. D.J. Morgan, R.L. Gambles, L. Zsuffa and C.P. Mitchell (Eds.). Uppsala, Sweden, 11 June 1984. pp. 31-56.
(The potential of carefully selected and purposefully bred plant materials as an energy source, including a review of experience with hybrid poplar in Ontario.)

2. COLOMBO, S.J. 1985. Improving the quality of overwintered container stock using extended greenhouse culture. In Proc. Nurserymen's Meeting, Swastika Forest Station, 18-21 June 1984. pp. 30-33.
(Keeping seedlings in the nursery until high levels of frost hardiness have been achieved can reduce levels of winter damage from 20% to less than 1%. Increased bud development results in improved plantation performance after outplanting.)

3. COLOMBO, S.J. 1985. Interpreting the significance of plant moisture stress by means of the pressure-volume technique. In Proc. Nurserymen's Meeting, Swastika Forest Station, 18-21 June 1984. pp. 58-65.
(Preliminary trials suggest that nursery stock may be able to tolerate moisture stress which exceeds the wilting point by 5 to 10 bars. Measurement should be done at the time nursery stock is shipped.)

4. COLOMBO, S.J., K.D. ODLUM and C. GLERUM. 1985. The use of the pressure bomb for assessing the quality of tree seedlings. In Proc. Workshop on Evapotranspiration, Irrigation and Plant Moisture Stress in Agriculture and Forestry. D.C. MacIver and R.B. Street (Eds.). Kortright Centre for Conservation, Kleinburg, Ont., 2 Oct. 1984. pp. 66-72.
(The pressure bomb holds considerable promise as a tool for nursery and forest managers to evaluation of nursery stock with respect to moisture stress.)

5. GLERUM, C. 1985. Stock production research program--overview. In Proc. Nurserymen's Meeting, Swastika Forest Station, 18-21 June 1984. pp. 26-27.
(Current research and future directions are outlined. Topics include: measuring planting stock quality, stock type testing, improving nursery stock and cultural techniques.)

6. GLERUM, C. 1985. Root pruning at time of lifting. Panel discussion. In Proc. Nurserymen's Meeting, Swastika Forest Station, 18-21 June 1984. p. 55.
(Disadvantages of this common nursery practice are outlined.)

7. GLERUM, C. 1985. Frost hardiness of coniferous seedlings: principles and applications. In Evaluating seedling quality: principles, procedures, and predictive abilities of major

tests. M.L. Duryea (Ed.). Proc. of workshop held at Forest Research Laboratory, Oregon State University, Corvallis, 16-18 Oct. 1984. pp. 107-123.
(The importance to the tree grower of frost hardiness and the practical applications of this basic knowledge are discussed in sufficient detail to serve as a guideline for frost hardiness testing.)

8. GLERUM, C. and J.M. PATERSON. 1985. A comparison between red pine seedlings and transplants five years after outplanting. OMNR Forest Res. Note no. 39. 4 p.
(The 1+2 stock type appears to be a viable alternative to the 2+2 stock type, because it is cheaper to grow, is more compact, and is easier to handle and plant, while it still performs well.)

9. GORDON, A. 1985. Budworm! What about the forest? In Spruce-fir Management and Spruce Budworm. Proc. 2nd SAF Region VI Tech. Conf., Burlington, VT, 24-26 Apr. 1984. 29 p.
(Stand structures and dynamics of white spruce-fir and red spruce-fir forests are related to budworm activity. The argument is presented that where spruce and fir grow together, budworm are an essential factor in maintaining spruce in the stand through time.)

10. HO, R.H. 1985. Effect of repeated pollination upon filled seed in white spruce. Can. J. For. Res. 15: 1195-1197.
(Repeated pollinations with brush had very little effect on the production of filled seed. Pollen from the first pollination was most likely to accomplish fertilization.)

11. HO, R.H. and Y. RAJ. 1985. Haploid plant production through anther culture in poplars. For. Ecol. and Manage. 13:133-142.
(Haploid induction through anther culture has made the production of isogenic pure lines possible. In vitro culture could also provide novel forms of variation by inducing destabilization in cell genetics.)

12. HOOD, J.V. 1985. Development of genetic strategies for clonal forestry. In Clonal Forestry: Its Impact on Tree Improvement and Our Future Forests. Proc. 19th Meeting Can. Tree Improvement Assoc., Part 2. Toronto, Ont., 22-26 Aug. 1983. pp. 84-95.
(Population structure and function, selection, mating, testing and deployment are operational aspects whose genetic components need some "fine-tuning" to take advantage of possible benefits.)

13. HUTCHISON, R.E. 1985. Root soaking at time of planting. Panel discussion. In Proc. Nurserymen's Meeting, Swastika Forest Station, 18-21 June 1984. pp. 55-57.
(Root soaking guidelines are needed on a per species basis. Recent tests show that some planting stock may deteriorate instead of being improved by root soaking.)

14. (KELLEHER, M.) and C.S. PAPADOPOL. 1985. Pre-feasibility study on expansion and upgrading of Port Dover sewage treatment plant.

In Proc. Technology Transfer Conference, Part 2, Water Quality Research. Toronto, Ont., 11-12 Dec. 1985. Ont. Ministry of the Environment. pp. 198-225.
(Cost/benefit analysis of sewage disposal by spray irrigation of a hybrid poplar tree farm. Other options reviewed: conventional activated sludge, rotating biological contactors, biological aerated filters, extended aeration. The tree farm is most economical over a twenty-year period.)

15. KIM, Y.T. and R.H. LEECH. 1985. Effects of climatic conditions on sap flow in sugar maple. For. Chron. 61(4): 303-307.
(Temperature played the most important role in the sap flow, and good sap flow occurred with extreme fluctuations in temperature. Simple monitoring of temperature could help maple sap operators reduce labour to save time and money.)

16. MacIVER, D.C. and (J. MASTERTON). 1985. Climatograms of Ontario. In Proc. Workshop on Evapotranspiration, Irrigation and Plant Moisture Stress in Agriculture and Forestry. D.C. MacIver and R.B. Street (Eds.). Kortright Centre for Conservation, Kleinburg, Ont., 2 Oct. 1984. pp. 49-55.
(Broadened climatic data bases have been assembled, analysed and documented for 110 30-year climatic stations in Ontario. Two types of water balance climatograms are compared.)

17. MacIVER, D.C. and (R.B. STREET) (Eds.). 1985. Proc. Workshop on Evapotranspiration, Irrigation and Plant Moisture Stress in Agriculture and Forestry. Kortright Centre for Conservation, Kleinburg, Ont., 2 Oct. 1984. 112 p.
(Proceedings of a workshop on the use of climatological information for operational management.)

18. MacIVER, D.C. and (R.B. STREET). 1985. Integrated irrigation management for forestry. In Proc. Workshop on Evapotanspiration, Irrigation and Plant Moisture Stress in Agriculture and Forestry. D.C. MacIver and R.B. Street (Eds.). Kortright Centre for Conservation, Kleinburg, Ont., 2 Oct. 1984. pp. 41-48.
(Meteorological monitoring for integrated irrigation management could improve water management, and reduce energy and fertilization waste as well as damage due to excessive irrigation.)

19. MORGAN, D.J., (R.L. GAMBLES), L. ZSUFFA and (C.P. MITCHELL) (Eds.). 1985. Biomass characteristics for efficient energy conversion. Proc. Joint Workshop of IEA/FE, Programme Groups B, C, and D. Uppsala, Sweden, 11 June 1984. 103 p.
(Report of Programme groups on biomass growth and production, harvesting and conversion. Discussed were: present activities, collaboration and future plans for research; harvesting, transport and feedstock characteristics for combustion and gasification/liquifaction.)
N.B. Available from: Faculty of Forestry, University of Toronto, 203 College St., Toronto, Ontario, Canada M5S 1A1

20. ODLUM, K.D. and S.J. COLOMBO. 1985. Testing antitranspirants for nursery use. In Proc. Nurserymen's Meeting, Swastika Forest Station, 18-21 June 1984. pp. 153-156.
(Laboratory testing of six antitranspirants to distinguish

which are most effective and to ensure that no damaging side-effects occur.)

21. PAPADOPOL, C.S. and (T.D. NOLAN). 1985. The potential of tree plantation technology in the land treatment of wastewater from food processing industry. In Agricultural Waste Utilization and Management, Proc. Fifth International Symposium on Agricultural Wastes. Chicago, Illinois, 16-17 Dec. 1985. ASAE Paper 13-85. pp. 411-417.
(The use of a poplar plantation as a final link in the treatment of high-strength effluent offers low energy expenditures, ecological soundness, and landscape aesthetics. Directions are suggested for more research.)

22. PATERSON, J.M. 1985. Multiple leadering--is it a field problem? In Proc. Nurserymen's Meeting, Swastika Forest Station, 18-21 June 1984. pp. 48-54.
(Early indications are that multiple-stemmed trees survive and grow as well as or better than single-leadered trees, with changes in leader dominance appearing by the end of the first year.)

23. PATERSON, J.M. 1985. Culling practices. In Proc. Nurserymen's Meeting, Swastika Forest Station, 18-21 June 1984. pp. 66-68.
(Systematic sampling of culled stock can help nursery growers identify cultural problems and thereby reduce cull and improve stock quality.)

24. (PELKONEN, P.) and GLERUM, C. 1985. Poplar clonal variation in frost hardiness and electrical impedance during the Fall. For. Res. Rep. No. 112. 15 p.
(Trials to determine the usefulness of electrical impedance in concert with freezing tests suggest that impedance is not yet suitable for routine measurements of frost hardiness without the accompanying freezing tests.)

25. PIERPOINT, G. 1985. Forest land classification: rationale and overview. In Proc. North Central Forest Soils Committee Symposium, Forest Land Classification: Experience, Problems, Perspectives. Madison, Wisconsin, 18-20 Mar. 1984. pp. 6-11.
(Text of keynote address to the Symposium.)

26. RACEY, G.D. 1985. A comparison of planting stock characterization with root area index, volume and dry weight. For. Chron. 61(2): 64-65, 68-70.
(Volume, area and weight methods for characterizing tops and roots of coniferous nursery stock were compared for accuracy, reproducibility and practicality using 60 seedling samples of red pine, white pine and white spruce.)

27. RACEY, G.D. 1985. Readiness for overwinter storage. In Proc. Nurserymen's Meeting, Swastika Forest Station, 18-21 June 1984. pp. 36-47.
(Three techniques for determining readiness for overwinter storage are compared: degree hardening days (DHD), electrical impedance (EI), and the oscilloscope--square wave method (OSW). The electrical methods appear to be more promising.)

28. RACEY, G.D. 1985. Root volume or root area index? In Proc. Nurserymen's Meeting, Swastika Forest Station, 18-21 June 1984. pp. 69-71.
(The estimation of root volume is suggested as a cheap, fast and repeatable stock characterization measure that correlates highly with outplanting performance.)

29. RACEY, G.D. 1985. Dissolved oxygen depletion by the roots of conifer seedlings during root soaking. OMNR Forest Res. Note No. 41. 4 p.
(Root soaking of more than eight hours' duration is not recommended, as prolonged soaking depletes oxygen without improving seedling quality or field performance.)

30. RACEY, G.D., C. GLERUM and R.E. HUTCHISON. 1985. Lifting and overwinter storage of white pine in southern Ontario. For. Chron. 61(6): 480-483.
(Cold (1-4°C) and frozen (-3°C) temperature regimes for overwinter storage are compared. Stock should be lifted shortly after the degree hardening day requirement has been met. Frozen storage is more effective at controlling mold.)

31. RACEY, G.D., R.E. HUTCHISON and C. GLERUM. 1985. Performance of black spruce accelerated transplants after five years. OMNR Forest Res. Note No. 40. 4 p.
(With the accelerated transplant technique, high quality shipping stock can be produced in two years instead of three. ATPs performed well when compared to conventional planting stock.)

32. RACEY, G.D. and E. RAITANEN. 1985. The effects of fibramulch application rates on conifer seedbeds. OMNR Nursery Note No. 114. 4 p.
(A study of the effects of seedbed mulching with various rates of fibramulch on seedling density and size at the end of the first growing season of red pine and white spruce.)

33. (SHAW, D.V.) and J.V. HOOD. 1985. Maximizing gain per effort by using clonal replicates in genetic tests. Theor. Appl. Genet. (1985) 71: 392-399.
(The use of clonal replicates in genetic tests can increase the cumulative or additivie genetic gain that is obtained at each cycle of breeding, relative to that expected from the single ramet, without an increase in test effort.)

34. SKEATES, D.A. 1985. Improved seed efficiency through high density accelerated production of coniferous transplants. In Clonal Forestry: Its Impact on Tree Improvement and Our Future Forests. Proc. 19th Meeting Can. Tree Improvement Assoc., Part 2, Toronto, Ont., 22-26 Aug. 1983. pp. 207-212.
(Pregrowing or pregermination techniques for greenhouse production systems are discussed. Developments with the cigarette micro-container are described, with potential applications.)

35. STROMPL, G. 1985. Grading northern red oak planting stock. Tree Planters' Notes, U.S. Dept. of Agriculture, 36(1): 15-18.
(A system for morphological grading of red oak nursery stock, based on stem diameter and length, stem form, buds and roots, is described.)

36. WEINGARTNER, D.H. and (J.T. BASHAM). 1985. Variations in the growth and defect of aspen (Populus tremuloides Michx) clones in Northern Ontario. For. Res. Rep. No. 111. 26 p.
(Broad sense heritability estimates revealed that genetic variation was responsible for less than one-third of phenotypic variation. Silvicultural techniques may achieve more than clonal management in improving aspen stands.)

37. (WHITNEY, R.D.) and G.B. MacDONALD. 1985. Effects of root rot on the growth of balsam fir. Can. J. For. Res. 15(5): 890-895.
(Growth reductions were smallest in trees with intermediate surrounding basal areas and in trees on drier or heavier textured soils.)

38. ZSUFFA, L. 1985. Concepts and experiences in clonal plantations of hardwoods. In Clonal Forestry: Its Impact on Tree Improvement and Our Future Forests. Proc. 19th Meeting Can. Tree Improvement Assoc., Part 2, Toronto, Ont., 22-26 Aug. 1983. pp. 12-25.
(Mosaics of monoclonal blocks that are relatively small and similar in size, in which clones are matched to soils, plantation systems and production objectives, seem to be the only reasonable choice for intensively managed plantations.)

39. ZSUFFA, L., R.M. RAUTER and C. YEATMAN. (Eds.) 1985. Clonal Forestry: Its Impact on Tree Improvement and Our Future Forests. Proc. 19th Meeting Can. Tree Improvement Assoc., Part 2, Toronto, Ont., 22-26 Aug. 1983. 235 p.
N.B. Available from The Editor, C.T.I.A./A.C.A.A., Canadian Forestry Service, Petawawa National Forestry Institute, Chalk River, Ontario K0J 1J0.